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AUTHOR	Alexander, Theron; Stoyle, Judith
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ABSTRACT

This study determined which intellectual abilities account for IQ changes over the school year. All the Head Start subjects involved in the study (35 boys and 33 girls, mean age 44.1 months) lived in poverty under conditions of urban deterioration. The subjects were initially given the Standord-Binet Intelligence Scale in the fall and were tested again 6 months later. Tasks from the Binet were grouped according to categories: comprehension, verbal ability, performance, drawing, visual perception, and memory. The findings indicated that in the overall shift in the pattern of cognitive abilities, change in two categories (visual perception and comprehension) accounted for the rise in IQ encountered during the Head Start year. (CS)

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CULTURE, COGNITION, AND SOCIAL CHANGE: THE EFFECT OF THE HEAD START EXPERIENCE ON COGNITIVE PATTERNS[1]

Theron Alexander and Judith Stoyle

Temple University

A. INTRODUCTION

Research studies for more than three decades have indicated that performance on intelligence tests by very young children is improved by educational experiences. Since the early study by Skeels, Updegraff, Wellman, and Williams (1938) at the University of Iowa showing that IQ can be raised, other investigators have continued to support their findings. In the past decade, an increasing number of studies have been undertaken on the

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premise that intellectual capacities of young children can be altered. This view has continued in spite of the often expressed opposing one that intelligence is constant, not only in the early years but throughout the life span.

Interest in finding new ways to improve cognitive capacity, as indicated by an increase in IQ, burgeoned as the result of the Head Start programs in the 60's. The renewed emphasis also added to the fires of controversy over the constancy of intellectual levels (Jensen, 1969; Coleman, 1968, 1971; Kagan, 1969). In current discussions about the nature of intelligence the question of whether or not intelligence consists primarily of one factor or of several factors has not been of much concern. Rather, questions about the nature of intelligence have been overshadowed by questions about the possibility of increasing it (Gewirtz, 1968).

It seems that regardless of research studies or theoretical controversies, two beliefs continue: (1) that intelligence is amenable to alteration in the early years, and (2) that intelligence consists of a number of abilities. Perhaps these beliefs have survived because we hope for individual control over personal destiny and because we hold tenaciously to a view of individuality (Alexander, 1969, 1973).

The second issue, that of the unitary or multiple concept of intelligence, is being given direction by social demands and change. In reality, intelligence has never been seen as unitary. Alfred Binet in the earliest forms of his test included a wide range of tasks requiring a range of "abilities" (Peterson, 1969). Today children in classrooms are perceived as varying in their abilities to perform assigned tasks.

Thus, the issues of constancy and the number of elements making up intelligence are being given shape by observations of performance in everyday tasks. This approach to practical definition suggests that the meaning of intelligence is indeed culturally relative. As social change brings different conditions in the society, different beliefs about the values of cognitive capacities emerge. Accordingly, today many people believe that it is practical and useful to see intellectual abilities as not only malleable, but multiple. The early Head Start programs (preschool educational programs for disadvantaged children) provided the opportunity as well as the initiative to obtain further information about these issues. In this study the question was asked: If IQ changes are encountered over the school year, which intellectual abilities account for the change?

B. METHOD

1. Subjects. The characteristics of the Head Start subjects are shown in Table 1. All the children (35 boys and 33 girls, mean age 44.1 months) lived in poverty under conditions of urban deterioration. The Head Start classes were supervised by the city school system and were supported by the Office of Economic Opportunity.

2. Procedure. The subjects were initially given the Stanford-Binet Intelligence Scale in the Fall. An interval of at least six months elapsed before final testing in the Spring. Testing was done in rooms separate from the classroom where only the examiner and child were present.

Tasks from the Binet were grouped according to the following categories: Comprehension, Verbal Ability, Performance, Drawing, Visual Perception, and Memory (Terman & Merrill, 1960). (See Table 2). Comprehension includes the ability to place elements of a stimulus complex into a "whole," and to develop from the whole a total meaning. Verbal Ability is the capacity to use sounds as symbols and to give them meaning in relationship to patterns of objects in the environment. Performance includes the ability to use

Table 1

Age Means and Ranges in Months for Subjects at Beginning of Study (Fall Testing)

Sex	N	Mean	Range
Male	35	45.3	39-59
Female	33	42.8	37-55
Total	68	44.1	37-59

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Table 2

Classification of the Stanford-Binet

Questions into Categories

Classification	Question Number	Question (abbreviated)
Comprehension	II/6-1	Show me what we drink out of, etc.
	III/6-6	What must you do when you are thirsty?
	IV-3	Opposite analogies
	IV-4	Show me what we cook on, etc.
	IV-6	Why do we have houses? etc.
	IV/6-4	What is a house made of? etc.
	IV/6-5	Three commissions: put pencil on chair, etc.
	IV/6-6	What do we do with our eyes? etc.
Verbal Ability	II-3	Identify parts of the body
	(II/6-2)	Identify parts of the body
	II-5	Picture Vocabulary
	(II/6-4,	Picture Vocabulary
	III-2,	Picture Vocabulary
	IV-1)	Picture Vocabulary

(Continued on next page)

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	II-6	Word combinations
	II/6-3	Name objects
	II/6-6	Obey simple commands: Give me the dog, etc.
	III/6-4	Stories about pictures
	V-3	Definitions
Performance	II-1	Three hole form board
	II-4	Block building--tower
	III-1	Stringing beads
	III-3	Block building--bridge
	III/6-2	Picture puzzle
	V-2	Paper folding: triangle
	V-6	Patience--rectangles
Drawing	III-5	Copy a circle
	III-6	Draw a vertical line
	V-1	Picture completion: man
	V-4	Copy a square
Visual Perception	III/6-1	Which ball is bigger?
	III/6-3	See the animals. Find me another just like it.

(Continued on next page)

(Table 2 continued, p. 3 of 3)

	III/6-5	Sorting buttons
	IV-5	See all these things. Find me another like it.
	IV/6-1	Which one is prettier?
	IV/6-3	Pictorial similarities and differences
	V-5	Pictorial similarities and differences
Memory	II-2	Hide kitty under box. Can you find it?
	II/6-5	Repeat two digits
	III-4	Picture memories
	IV-2	Name objects from memory

objects in relationship to each other. Drawing is the ability to construct symbolic representation. Visual Perception involves the ability to perceive differences and similarities among visual stimuli. Memory is defined as the ability to store or retain experiences and learned responses, and to use them later.

C. RESULTS

At the beginning of the school year the test scores established a group ranking (higher scores to lowest) of the categories: (1) Visual Perception, (2) Performance, (3) Verbal Ability, (4) Comprehension, (5) Memory, and (6) Drawing. The ranking as the result of testing at the end of the year changed to: (1) Visual Perception, (4) Comprehension, (2) Performance, (3) Verbal Ability, (6) Drawing, and (5) Memory. Thus, categories 1, 2, 3, 4, 5, 6 became 1, 4, 2, 3, 6, 5. Two categories, Visual Perception and Comprehension, showed significant change (modified Chi-square test, $p < .001$). (See Figure 1).

In Tables 3 and 4, the changes in the Binet IQ over the year are shown. The increase in mean IQ during the year was about nine points.

Figure 1

Number of Binet Points Obtained by Subjects in Each Category for Initial and Final Testing

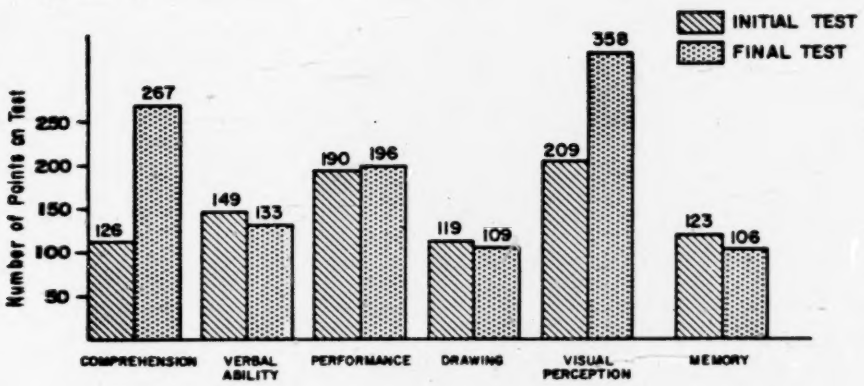


Table 3

Comparison of Initial (Fall) and Final (Spring) IQ

Testing Period	N	Mean	Range	SD
Boys				
Initial	35	89.8	68-105	9.1
Final	35	99.8	79-118	9.5
Girls				
Initial	33	95.9	75-130	12.9
Final	33	103.7	89-135	10.2
Total Initial	68	92.8	68-130	11.4
Total Final	68	101.7	79-135	9.9

Table 4

IQ Change Over the Year

IQ Category	f	Average Change in IQ Points	
130-139	1	- 4.0	
120-129	1	10.0	- 3.0
110-119	2	- 9.0	
100-109	12	3.3	6.5
90-99	24	8.1	
80-89	21	11.8	
70-79	5	20.4	13.6
60-69	2	16.5	

D. DISCUSSION

The pattern of abilities shifted over the school year with the greatest gain occurring in tasks grouped under Comprehension. An example of the tasks included in the category is "Why do we have houses?" The category also included tasks that required the child to follow instructions, such as "Here's a pencil. I want you to put it on the chair. . . ." The ability to perform these kinds of tasks certainly should be considered important in meeting school requirements in the early grades. A gain in the child's ability to perform these tasks should be viewed as indicative of a better prospect of meeting the requirements of regular school.

The second category showing a significant increase was Visual Perception. It consisted of such items as "Which ball is bigger? Find me another one just like this up here." (This is the language of the Binet.) Ability to make such discrimination is obviously important in meeting many school requirements (Hollenberg, 1970). The highest scores were obtained in this category.

The cateogry of Verbal Ability showed little change--a slight decrease. Tasks in this category included the "naming of objects" and telling stories

about pictures.

The Performance category, with such items as the "formboard" and "picture puzzles," also showed little change. Ability to do the tasks was somewhat greater than that shown in the Verbal Ability category. Apparently the school experience had little effect on ability to perform tasks in this category.

Items classified as Drawing and Memory showed the lowest scores at the beginning. In these, too, little change as result of the program was indicated.

The educational experience provided for the children in the separate schools was generally similar. Some limitations were common to all. One was the type of facility used. Most classes met in church basements where opportunities for active play was limited. Equipment for the classes was improvised and usually inadequate.

In searching for reasons for the upward change in ranking of Comprehension it should be noted that stories were frequently read to the children and interaction with the adults in reference to the stories was possible. This exchange suggests a basis for improvement in this category. The lack of improvement on verbal tasks, on the other hand, probably reflects insufficient opportunity for the children to use

language (Alexander, Stoyle, & Kirk, 1968).

Judgment about an educational program and its effectiveness reflects the value system of the culture. Thus, the experiences devised to bring change in performance on the tasks of the categories will reflect values placed on the categories that are considered significant in meeting future cognitive demands. Most would agree that a program that fails to bring improvement in Verbal Ability and Memory is deficient. While the overall increase in Binet IQ seems to be substantial, a lack of improvement in these two categories suggests that the children will have difficulty in meeting related school requirements.

The data obtained here indicate that the children who were most adversely affected by their deprived environment were the ones who gained the most from the year in preschool. The greater the initial ability, the less influential was the experience; the children in the superior range changed very little. (See Table 4).

This study does not lead to a simplistic view of the problem of changing the outlook for children growing up in poverty in the nation's cities. For example, it is not believed that a program of drill or "exercises" in the deficient areas will be effective.

Nor should this study be construed as indicating a belief in the efficacy of an "enrichment" program by providing "objects" to extend environmental experience. Nor do we believe that it leads to a view that questions the effectiveness of programs in early childhood on the basis of Piaget's stage theory (1966) that the very young child is not amenable to alleviative effort. We believe on the contrary that there is evidence to support the view that children from deprived environments do improve in performance of mental tasks as the result of a pre-school experience.

The change in the children's performance in this study, however, does not seem to warrant favorable predictions about subsequent successful school performance. Although an even more significant change than was shown here might be obtained by a better preschool experience, this still cannot be expected to sufficiently change the children's outlook. Rather, we believe that what is needed to change the outlook for these children is a change in the complex psychosocial factors in family and life space. It is our view that, in addition to the preschool experience, an effort must be made to alter the conditions under which the children live. Such alteration must include improvement in conditions in the family, housing, income, and health care. Unless

such change is achieved, educational programs by themselves will be an insufficient form of intervention.

Accordingly, if one asks, "Was the Head Start experience effective?" The answer has to be equivocal. It did benefit the children. To change the course of their lives and to alter the dire predictions often made about their later performance in school and in a social role, however, intervention must be broader than an educational effort alone. In addition to education, intervention must include action that will affect physical conditions in their life space as well as the emotional relationships in the family. Such an effort must accompany the educational program, if the outlook of these children is to be substantially changed. In this sense, IQ change is irrelevant, norms are inappropriate, and alteration of specific abilities is inconsequential unless the total life experience is made appropriate to the culture.

E. SUMMARY

The findings indicate that in the overall shift in the pattern of cognitive abilities, change in two categories (Visual Perception and Comprehension) accounted for the rise in IQ encountered during the Head Start year. Some inadequacy remained in areas such as

Memory and Verbal Ability. Therefore, on the basis of the findings in this study the preschool experience was only partially effective. We believe the favorable effect of the gains in the two abilities identified here will be offset by the adverse factors continuing in the lives of these children. For intervention to be successful, a "total" approach is needed.

A preliminary review of this research was reported in a paper at Digby Stewart College, London, at the British Nursery School Association.

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